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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/042,666 03/17/98 GALVANAUSKAS

A A7139

EXAMINER

MM91/0905

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ART UNIT

PAPER NUMBER

2874

DATE MAILED:

09/05/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/042,666

Applicant(s)
Almantas Galvanauskas et al.

Examiner
John D. Lee

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2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jul 23, 2001
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-28 is/are allowed.
- 6) ☒ Claim(s) 1-13, 29, and 30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:

- ☐ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. _____.
- ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

Applicant's communication filed on July 23, 2001, has been carefully considered by the Examiner. After meticulous study of the Arbore et al reference, it is now agreed that there is insufficient suggestion *in that reference alone* for the incorporation of the wavelength conversion apparatus 10 in optical waveguide form. The rejections set forth in the previous Office action are therefore withdrawn. In view of further search, however, and the consequent discovery of a relevant prior art document, new rejections are set forth below. This action is **not** made final.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action in parent Application No. 09/042,666.

Claims 1-11, 29, and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,815,307 to Arbore et al in view of U.S. Patent 5,912,910 to Sanders et al (newly cited). Arbore et al discloses an ultrashort pulse generator comprising an ultrashort optical pulse source and a wavelength conversion apparatus 10 for adjusting the chirp of the ultrashort optical pulse and converting the wavelength thereof (for example, to a second harmonic wavelength of the ultrashort optical pulse wavelength). The conversion apparatus 10 is a grating based device. The discussion in Arbore et al in column 6, lines 44-60, clearly suggests the use of many forms of quasi-phase-matched OPG elements. Sanders et al teaches (see Figure 8 and corresponding disclosure) that there are significant advantages in using quasi-phase-matched OPG elements in waveguide form (such as the ability to optimize pump or injection wavelengths). This fact was thus known in the art at the time of applicant's invention. In view of this teaching of Sanders et al, and in view of the broad suggestion of Arbore et al that the quasi-phase-matched OPG elements could be in various forms, and particularly since the advantages stated in Sanders et al would be welcomed in Arbore et al, the

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person of ordinary skill in the art would have found that the Arbore et al apparatus 10 could obviously be fabricated in an optical waveguide. The apparatus 10 of Arbore et al is also clearly an optical parametric device, operating on optical nonlinear principles to convert the wavelength of the ultrashort optical pulse therein. The second harmonic generation portion of the Arbore et al wavelength conversion apparatus constitutes a "mode converter" (as recited in applicant's claims 2 and 4). The use of adiabatically tapered input waveguides for ease of light insertion into other optical waveguides is well known in the art. The use of such an adiabatically tapered input waveguide in Arbore et al would thus have been obvious to the person of ordinary skill in the art. Note that the nonlinear material for wavelength conversion apparatus 10 can be a periodically-poled ferroelectric material such as KTP and isomorphs of KTP (column 6, lines 44-60, of Arbore et al). The specific ultrashort optical pulse source used in the reference is not identified, but the general discussion (see the paragraph bridging columns 6 and 7) indicates that a known ultrafast laser should be employed. This obviously implies that lasers such as those identified in applicant's claims 8-10 should be used, and the use of any of them would thus have been obvious to the person of ordinary skill. Regarding new claims 29 and 30, since the Arbore et al device is designed for ultrashort optical pulses (i.e. pulses in the nano-, pico-, and femto-second ranges), the generation of optical parametric threshold energy in the sub-nanojoule or picojoule regime would be inherent in the proposed Arbore et al/Sanders et al device.

Claims 12 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,815,307 to Arbore et al in view of U.S. Patent 5,912,910 to Sanders et al (newly cited), as applied to claim 1 above, and further in view of U.S. Patent 5,321,707 to Huber. The only difference

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between the proposed Arbore et al/Sanders et al device and that of applicant's claim 12 is that there is no amplifier upstream of the wavelength conversion apparatus 10 for amplifying the ultrashort pulses prior to conversion to a different (e.g. a harmonic) wavelength. The use of upstream and downstream amplifiers, such as rare earth doped optical fiber amplifiers, however, has been known in the art for a long time. Note, for example, the Huber reference, which shows a rare earth doped optical fiber amplifier 64 downstream of the active elements in a pumped active optical device. The person of ordinary skill in the art would have recognized that any optical signal that has been newly generated or converted will experience a loss in intensity as it travels along, thus necessitating the use of in-line amplifiers like that of Huber. It would thus have been obvious to use an upstream amplifier like the rare earth doped optical fiber amplifier 64 of Huber in the proposed Arbore et al/Sanders et al pulse generation device, providing the necessary amplification for the wavelength conversion apparatus 10. Regarding applicant's claim 13, the rare earth doped optical fiber amplifier of Huber includes erbium doped optical fiber amplifiers.

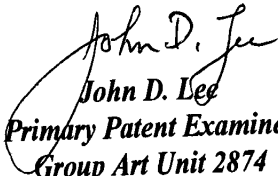
Claims 14-28 are allowed. The reasons are clearly stated in a previous Office action (paper number 4, mailed August 26, 1999) in parent Application No. 09/042,666.

Applicant's arguments with respect to the above-rejected claims have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (703) 308-4886. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at

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telephone number (703) 308-0956, to the technical support staff supervisor (Team 2) at telephone number (703) 308-3072, or to the Technology Center 2800 Customer Service Office at telephone number (703) 306-3329.


John D. Lee
Primary Patent Examiner
Group Art Unit 2874